FIG. 1

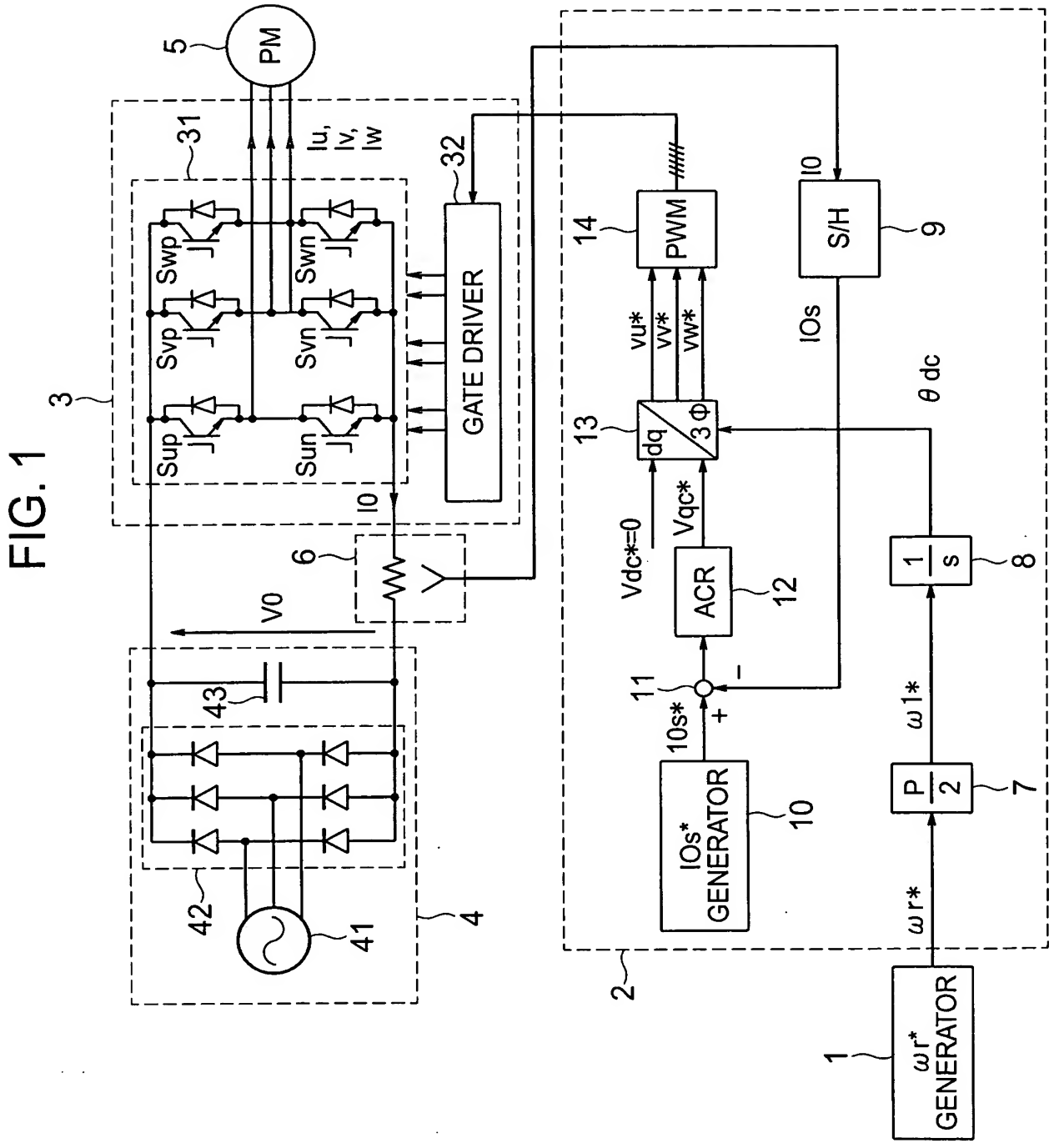

1
ωr* GENERATOR
2
3
4
5
PM
6
7
P/2
8
1/s
9
S/H
10
IOs* GENERATOR
11
12
ACR
13
dq/3Φ
14
PWM
31
32
GATE DRIVER
Swp
Svp
Sup
Swn
Svn
Sun
Iu, Iv, Iw
IO
IOs
V0
43
41
42
ωr*
ω1*
θdc
Vdc*=0
Vqc*
10s*
vu*
vv*
vw*

FIG. 2

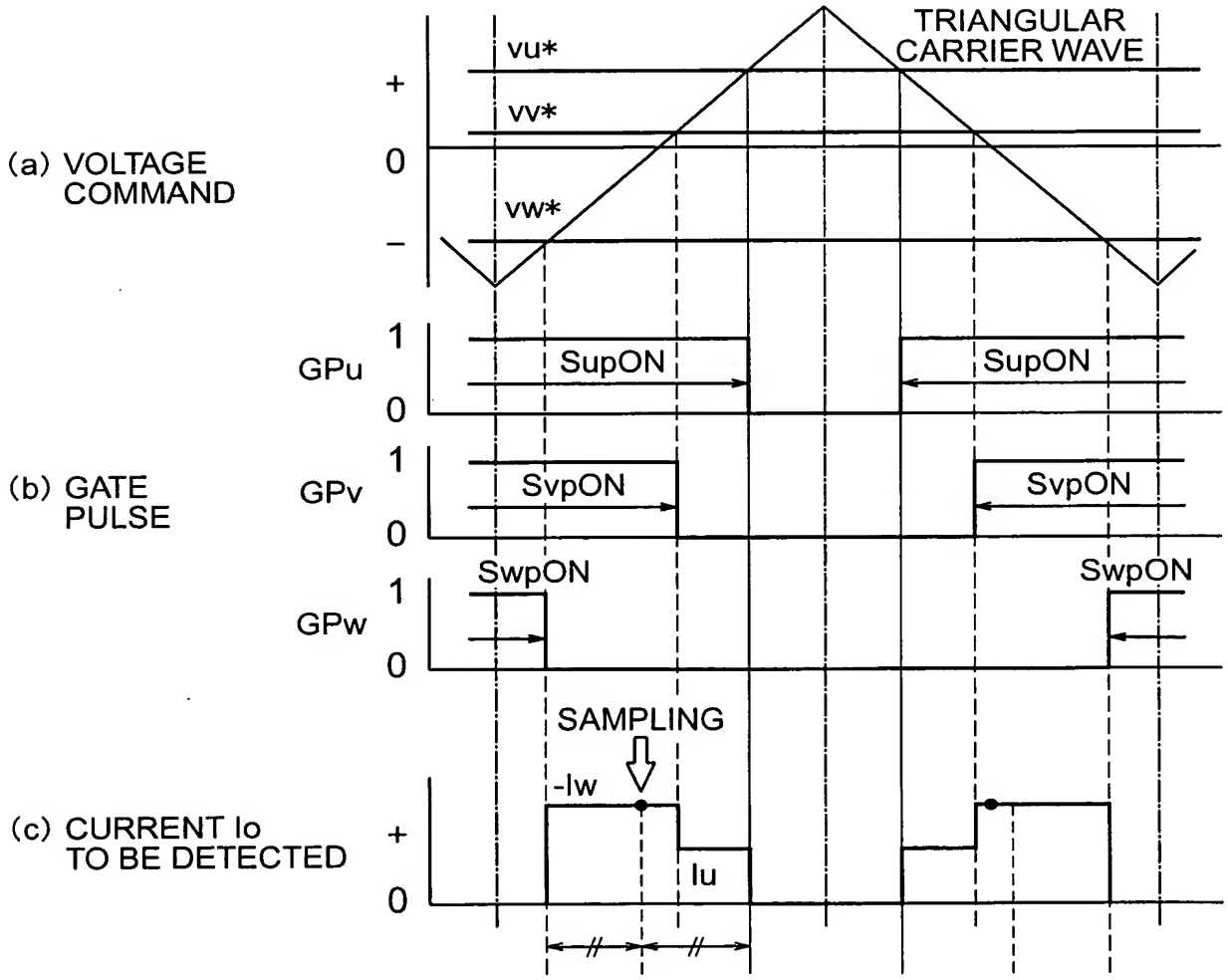

(a) VOLTAGE COMMAND
(b) GATE PULSE
(c) CURRENT Io TO BE DETECTED
TRIANGULAR CARRIER WAVE
vu*
vv*
vw*
+
0
−
GPu
GPv
GPw
1
0
SupON
SvpON
SwpON
SAMPLING
-Iw
Iu

FIG. 3

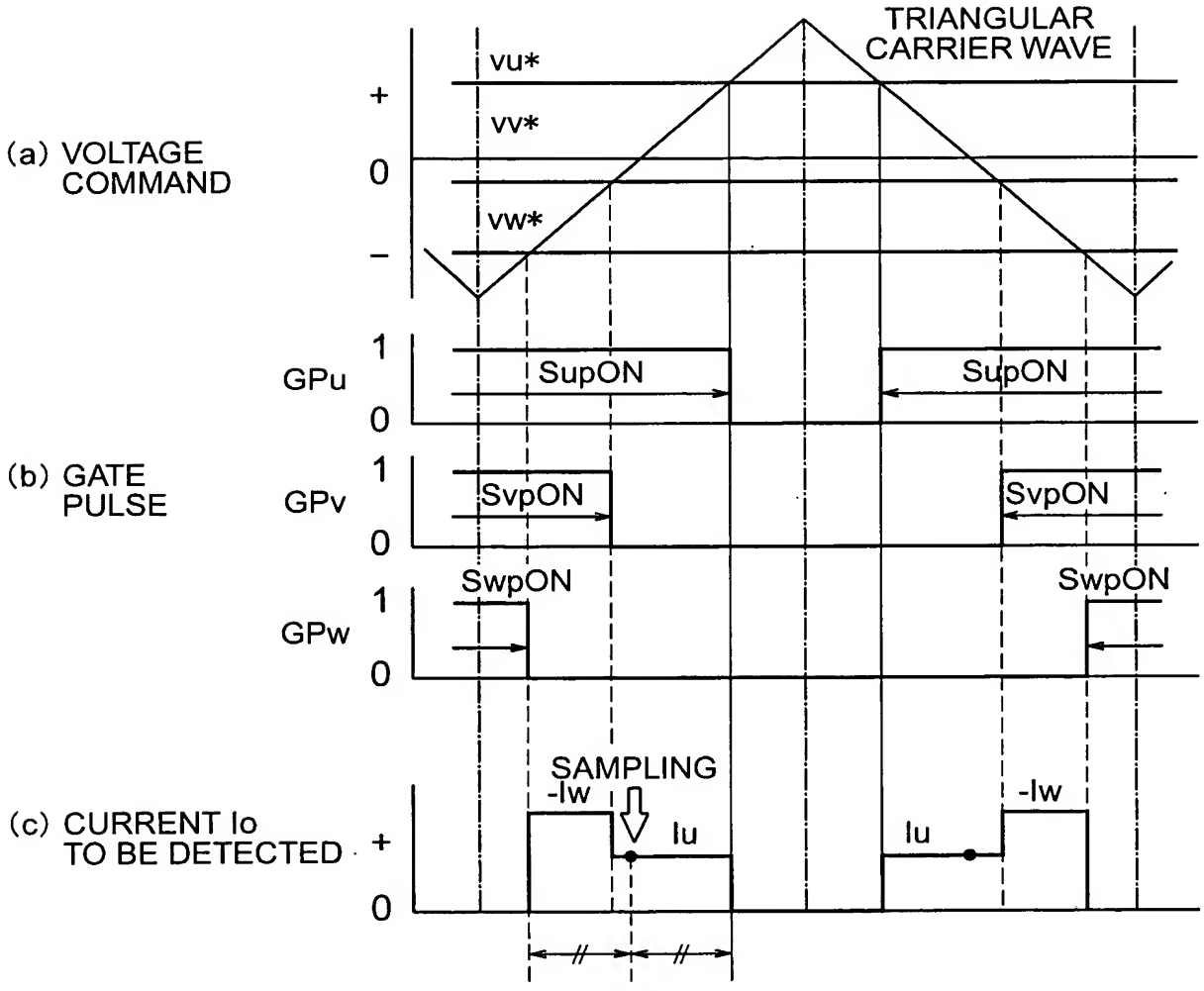

TRIANGULAR CARRIER WAVE
vu*
vv*
vw*
+
0
−
(a) VOLTAGE COMMAND
GPu
1
0
SupON
SupON
(b) GATE PULSE
GPv
SvpON
SvpON
GPw
SwpON
SwpON
SAMPLING
-Iw
Iu
-Iw
Iu
(c) CURRENT Io TO BE DETECTED

FIG. 4

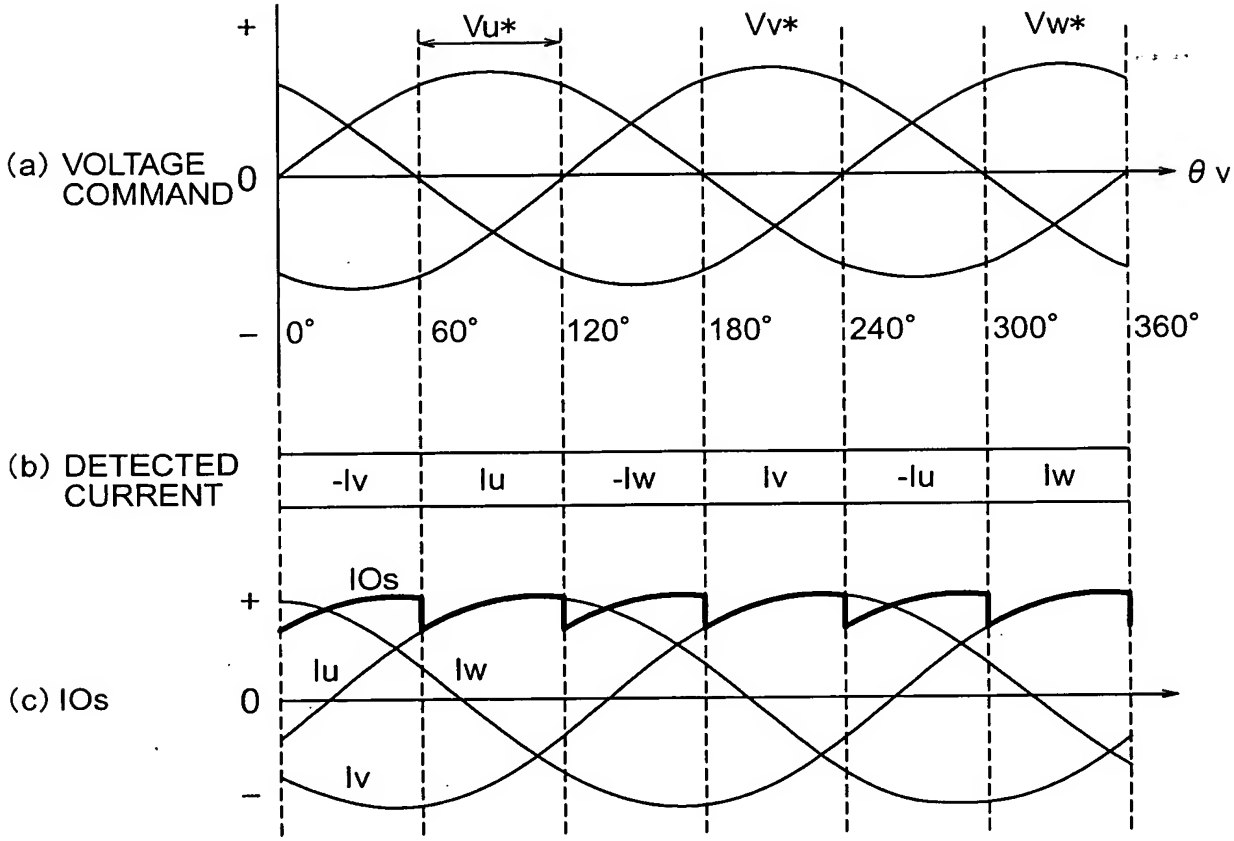

(a) VOLTAGE COMMAND
+
0
–
Vu*
Vv*
Vw*
θ v
0°
60°
120°
180°
240°
300°
360°
(b) DETECTED CURRENT
-Iv
Iu
-Iw
Iv
-Iu
Iw
(c) IOs
+
0
–
IOs
Iu
Iw
Iv

FIG. 5

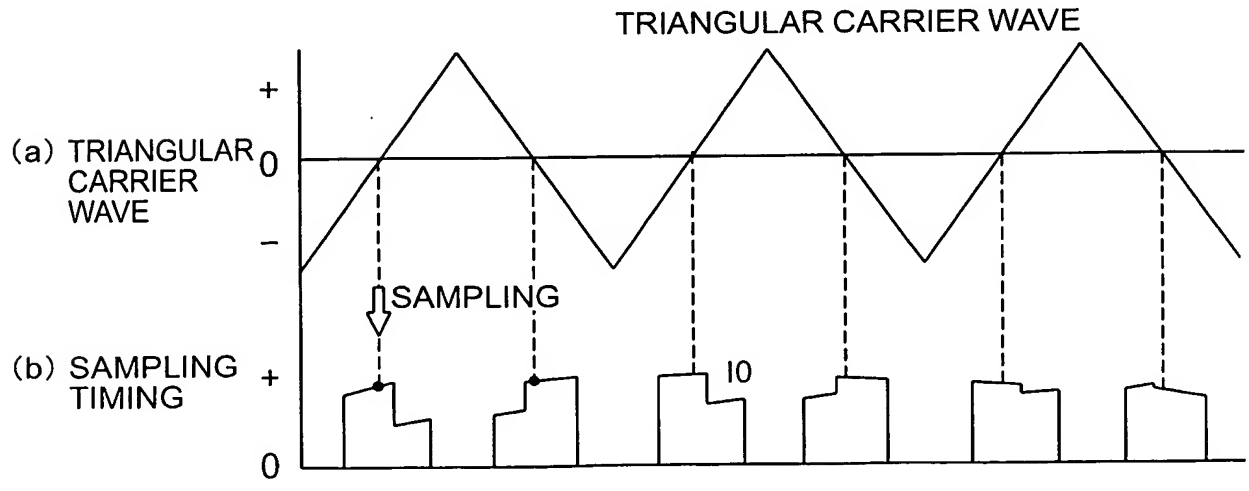

TRIANGULAR CARRIER WAVE
(a) TRIANGULAR CARRIER WAVE
+
0
–
SAMPLING
(b) SAMPLING TIMING
+
0
I0

FIG. 6

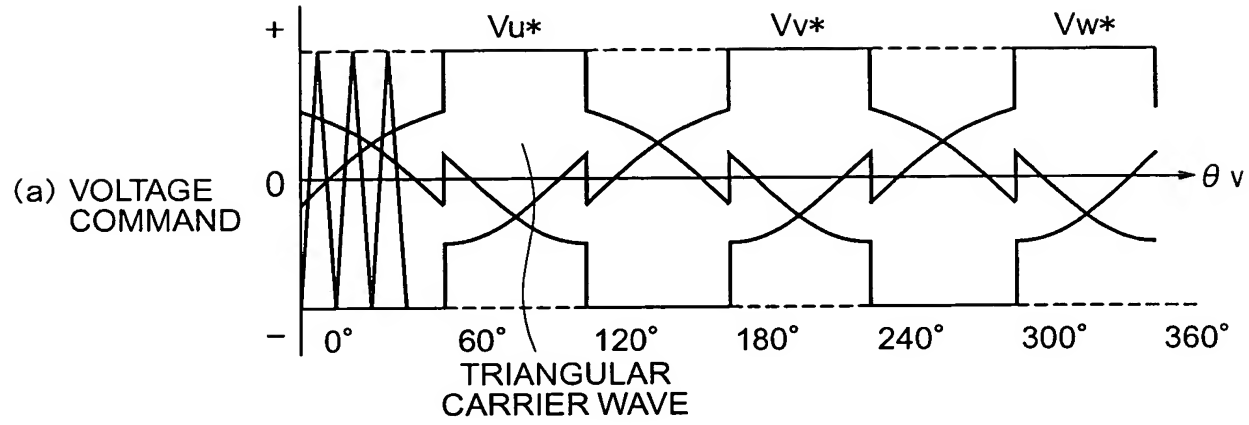

(a) VOLTAGE COMMAND
+
0
−
Vu*
Vv*
Vw*
θ v
0°
60°
120°
180°
240°
300°
360°
TRIANGULAR CARRIER WAVE

FIG. 7

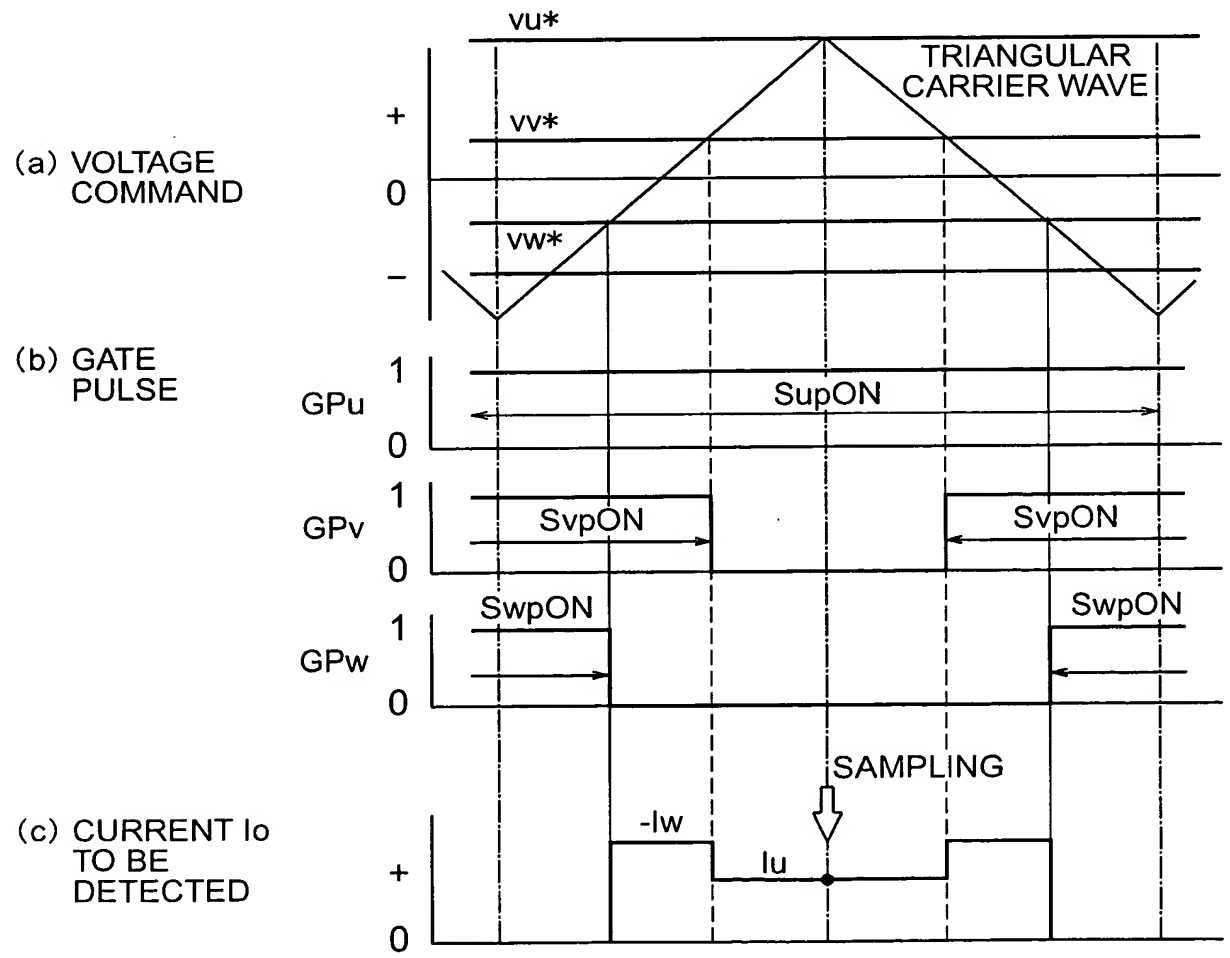

(a) VOLTAGE COMMAND
(b) GATE PULSE
(c) CURRENT Io TO BE DETECTED
vu*
vv*
vw*
TRIANGULAR CARRIER WAVE
+
0
−
GPu
GPv
GPw
1
0
SupON
SvpON
SvpON
SwpON
SwpON
SAMPLING
-Iw
Iu
+
0

FIG. 8

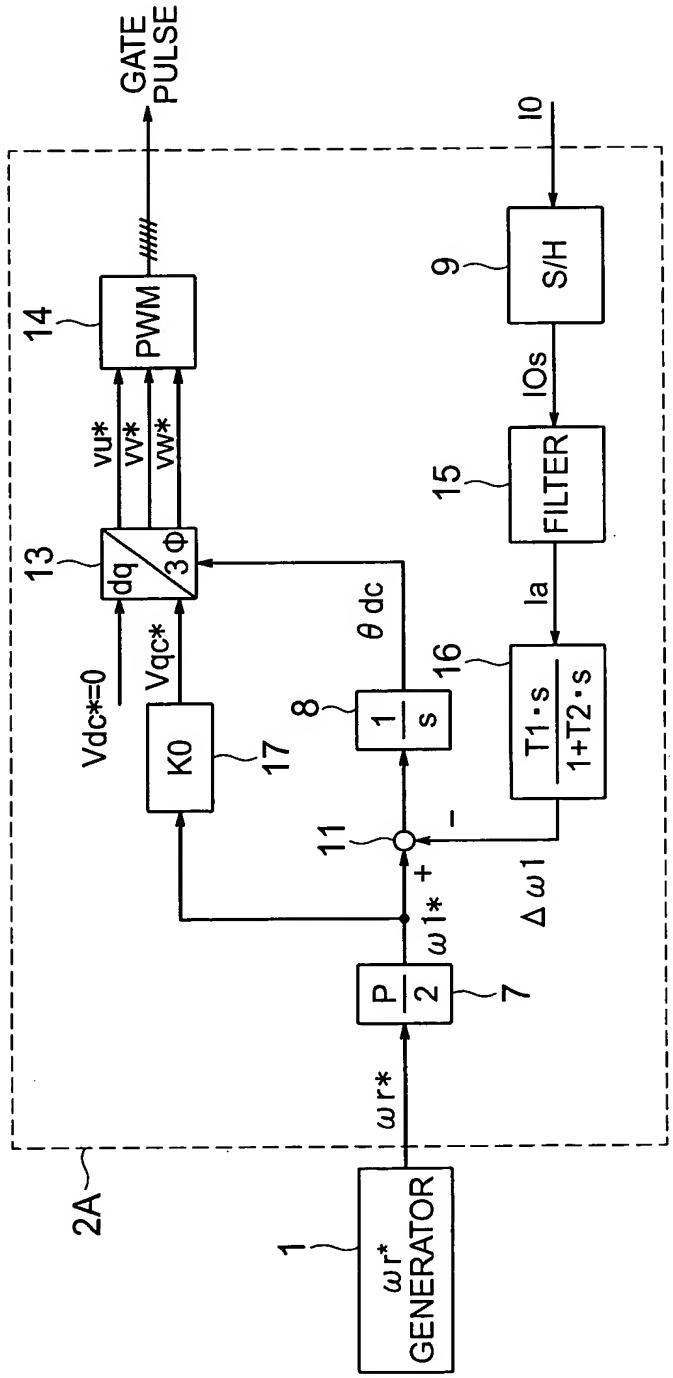

GATE PULSE
I0
9
S/H
14
PWM
IOs
15
FILTER
vu*
vv*
vw*
13
dq
3Φ
θdc
16
Ia
T1·s / 1+T2·s
Vdc*=0
Vqc*
8
1/s
17
K0
11
−
+
Δω1
ω1*
P/2
7
ωr*
2A
1
ωr* GENERATOR

FIG. 9

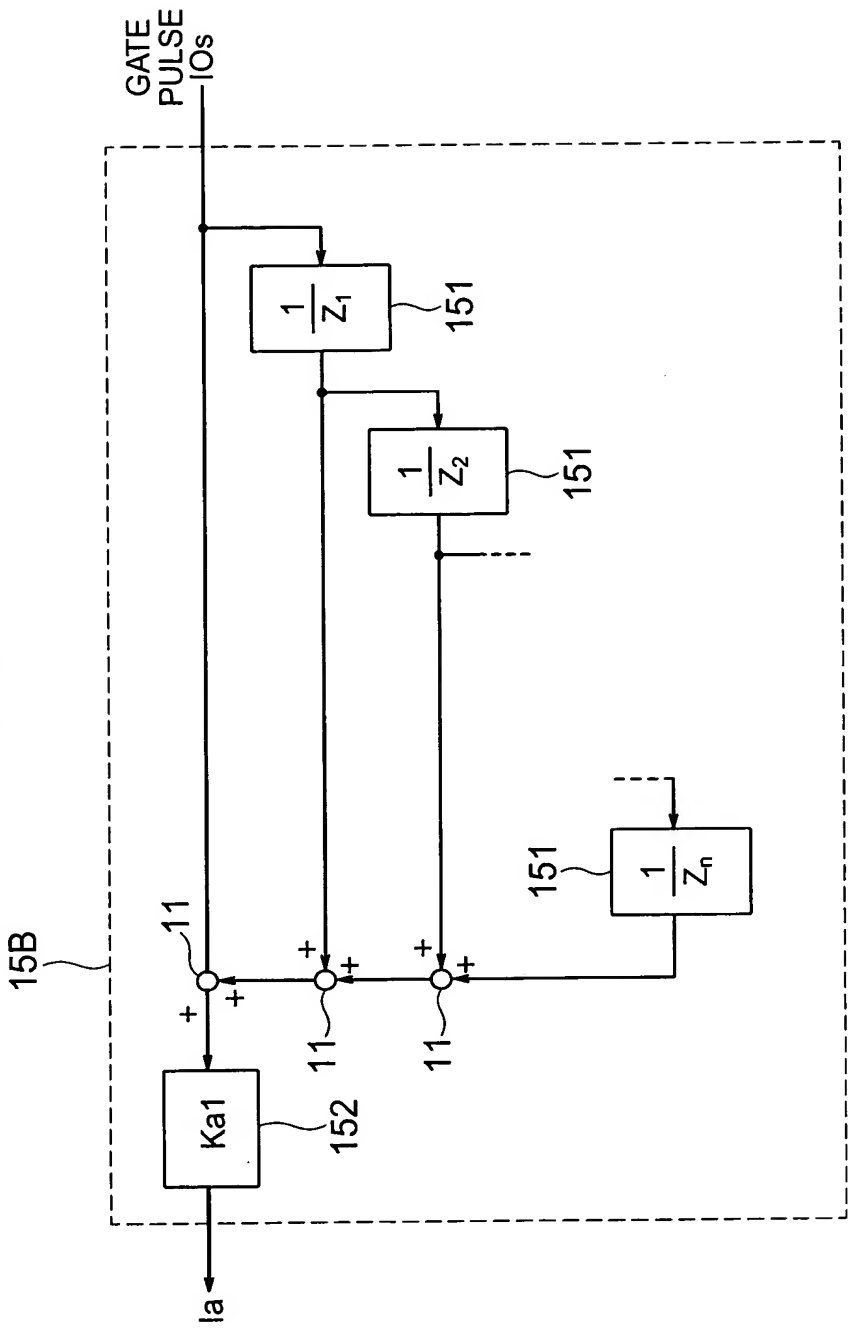


FIG. 10

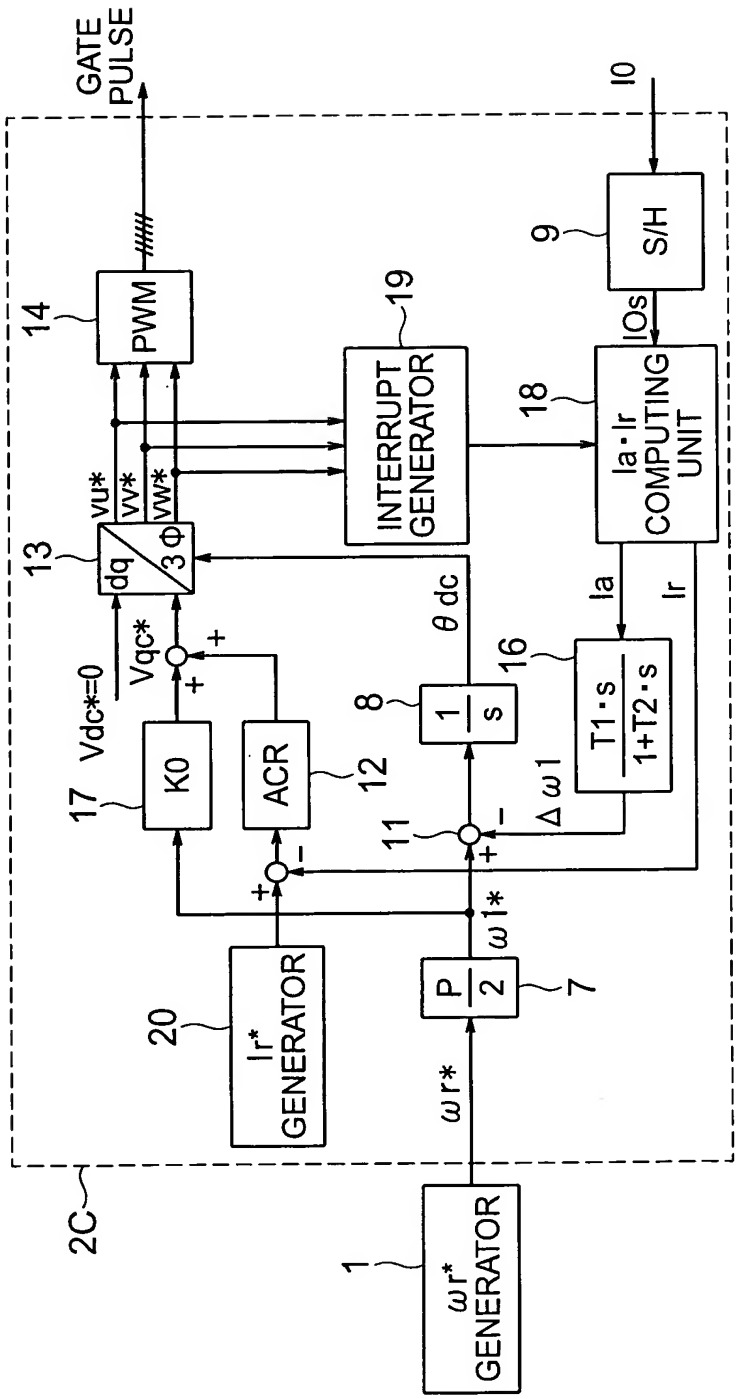

GATE PULSE
I0
9
S/H
14
PWM
19
INTERRUPT GENERATOR
18
Ia·Ir COMPUTING UNIT
IOs
VU*
VV*
VW*
13
dq
3Φ
θdc
Ia
Ir
Vdc*=0
Vqc*
16
T1·s / 1+T2·s
8
1/s
17
K0
ACR
12
Δω1
11
20
Ir* GENERATOR
P/2
7
ω1*
ωr*
2C
1
ωr* GENERATOR

FIG. 11

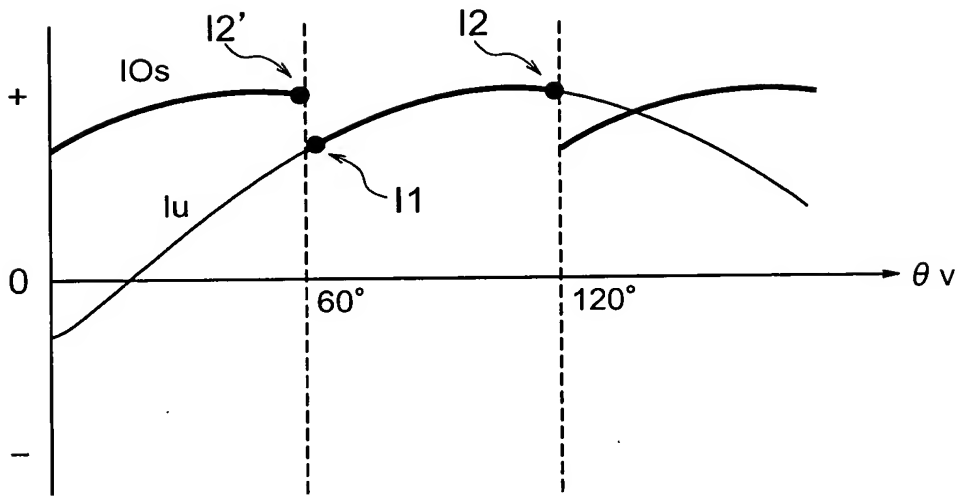


FIG. 12

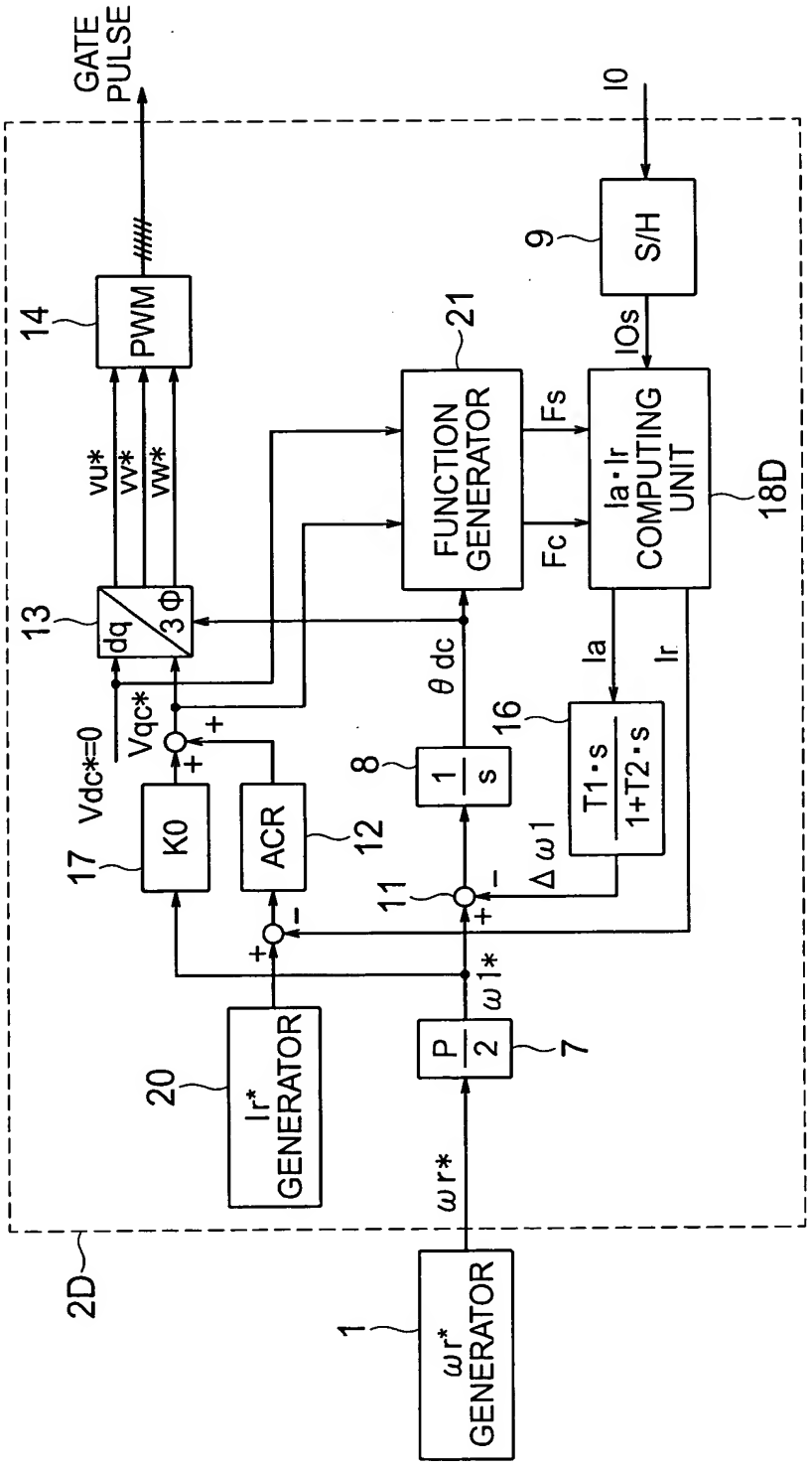

GATE PULSE
I0
9
S/H
IOs
14
PWM
21
FUNCTION GENERATOR
Fs
Fc
Ia·Ir COMPUTING UNIT
18D
vu*
vv*
vw*
13
dq
3Φ
θdc
Ia
Ir
Vdc*=0
Vqc*
16
T1·s / 1+T2·s
8
1/s
17
K0
ACR
12
Δω1
11
20
Ir* GENERATOR
P/2
7
ω1*
ωr*
2D
1
ωr* GENERATOR

FIG. 13

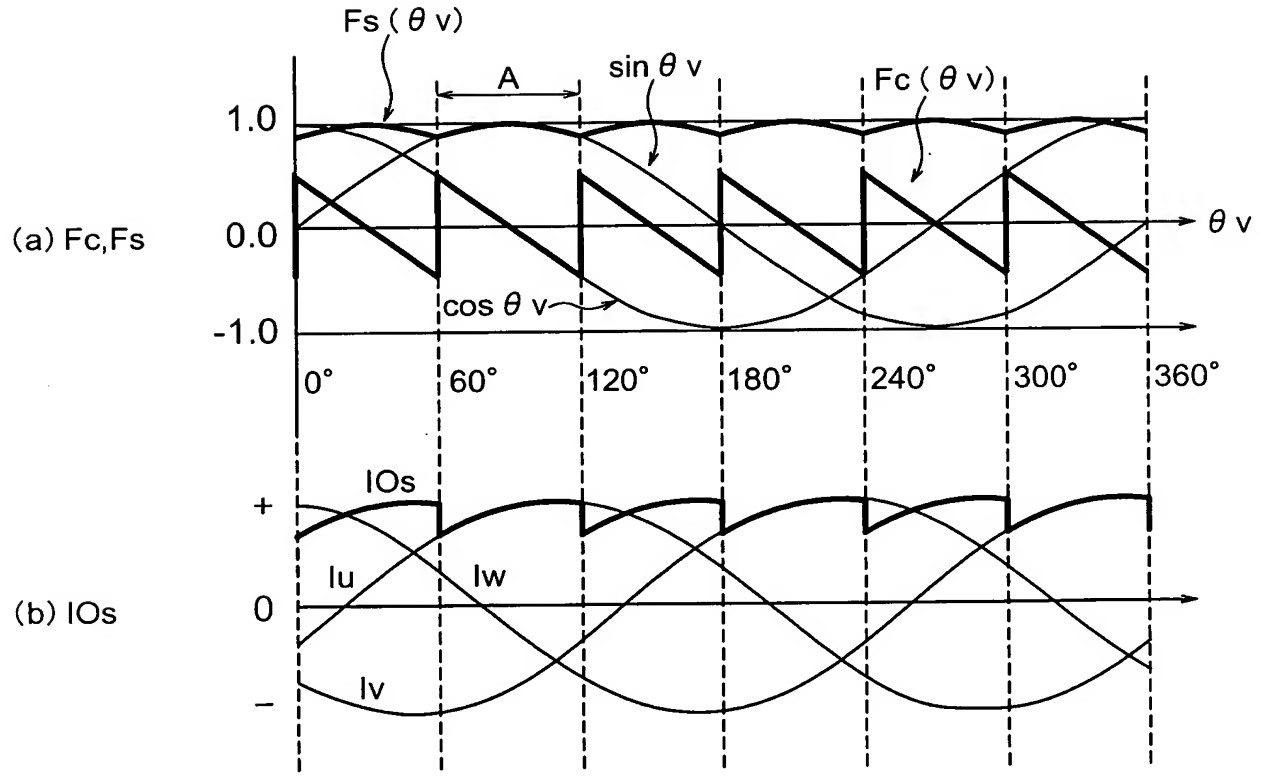

Fs (θ v)
A
sin θ v
Fc (θ v)
1.0
0.0
-1.0
θ v
cos θ v
0°
60°
120°
180°
240°
300°
360°
(a) Fc,Fs
IOs
+
Iu
Iw
0
Iv
–
(b) IOs

FIG. 14

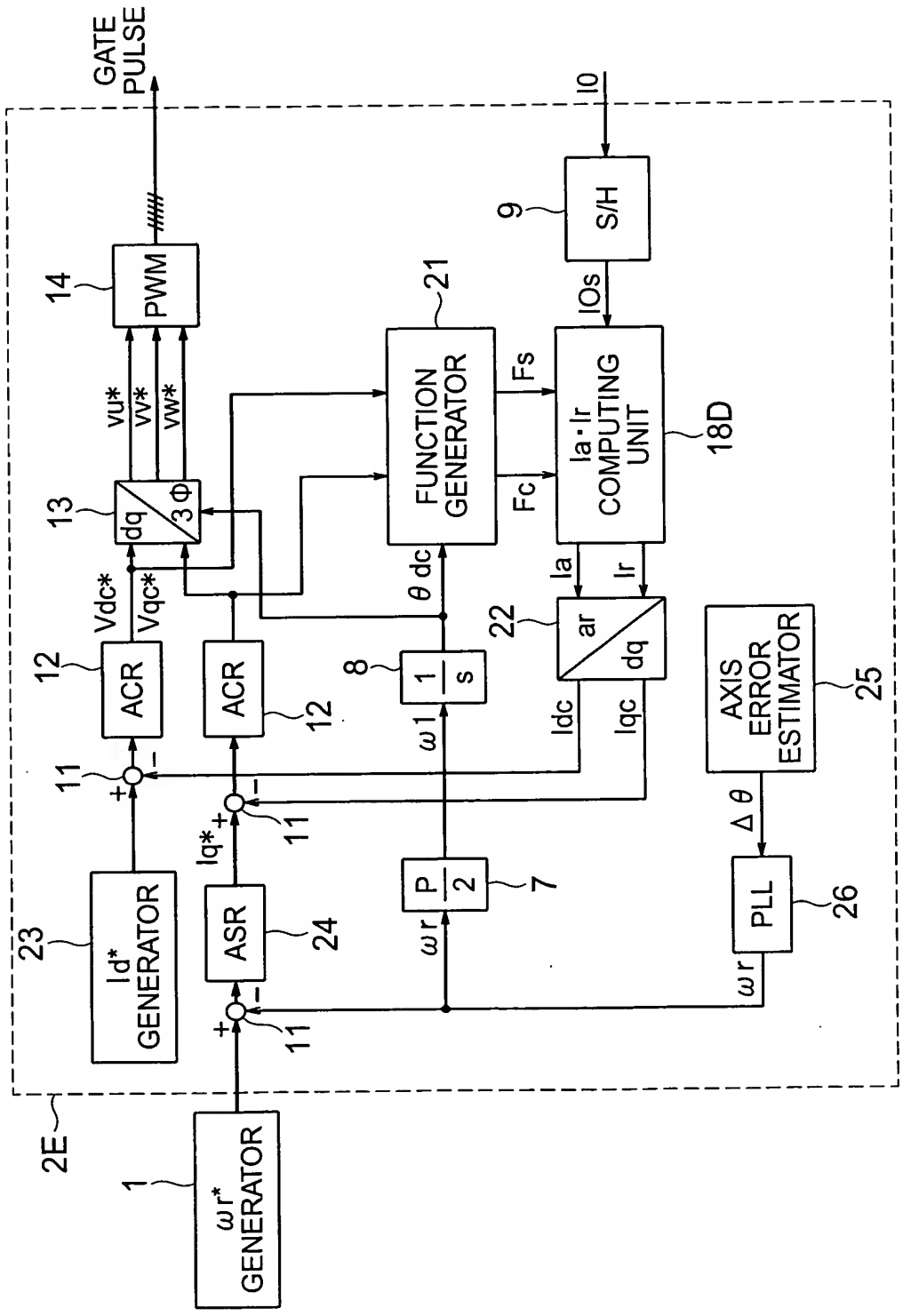

GATE PULSE
2E
1
ωr* GENERATOR
23
Id* GENERATOR
24
ASR
12
ACR
12
ACR
11
11
11
11
Vdc*
Vqc*
Iq*
13
dq
3Φ
14
PWM
vu*
vv*
vw*
8
1/s
ω1
θ dc
ωr
P/2
7
21
FUNCTION GENERATOR
Fs
Fc
9
S/H
IOs
IO
18D
Ia·Ir COMPUTING UNIT
Ia
Ir
22
ar
dq
Idc
Iqc
25
AXIS ERROR ESTIMATOR
Δθ
26
PLL
ωr

FIG. 15

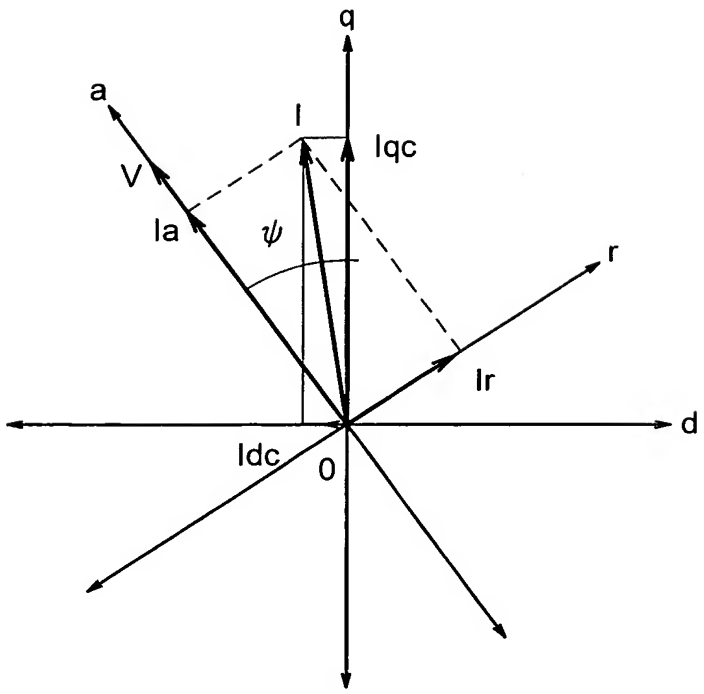
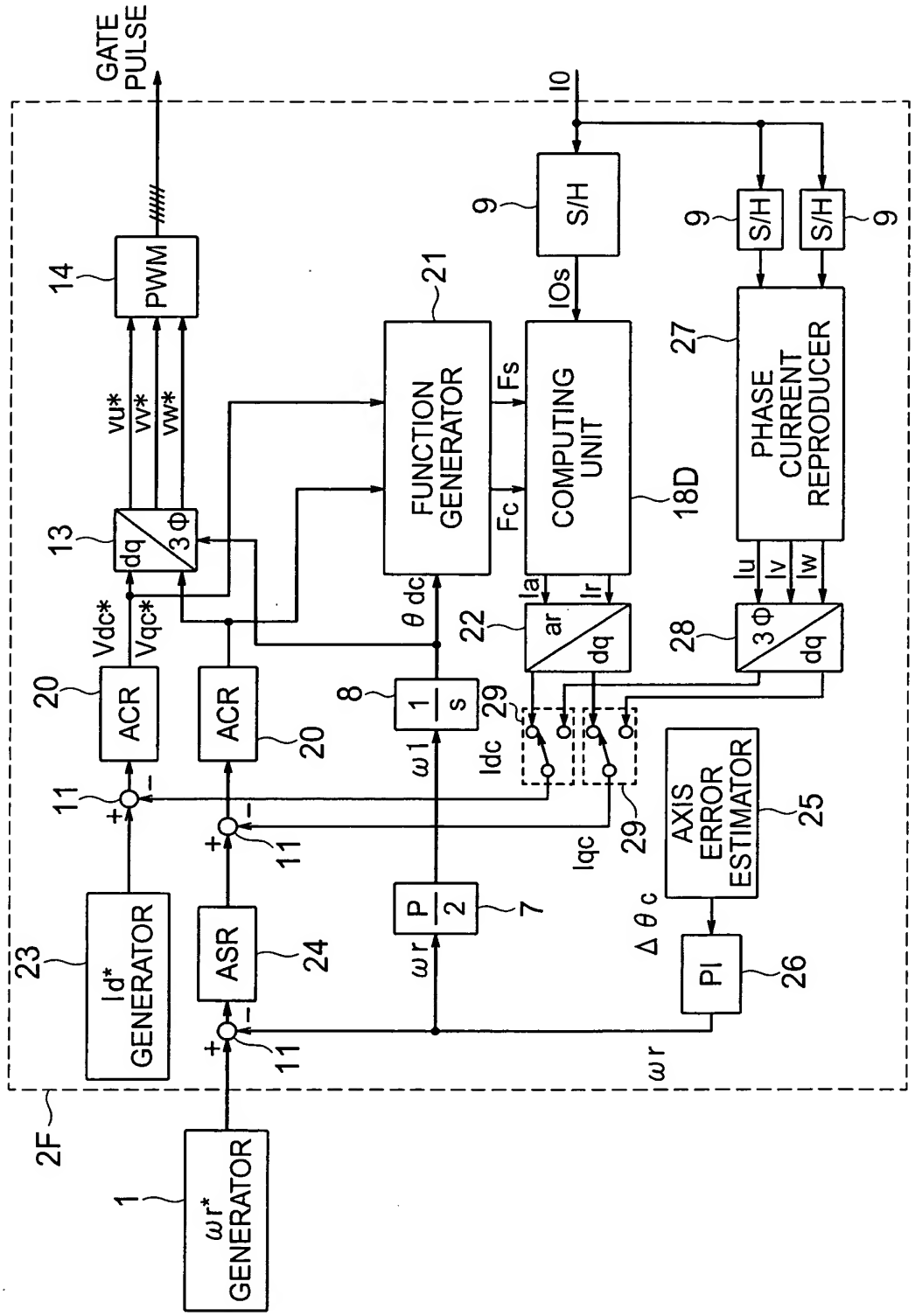


FIG. 16


GATE PULSE
PWM
14
vu*
vv*
vw*
dq
3Φ
13
Vdc*
Vqc*
ACR
20
ACR
20
11
11
11
Id* GENERATOR
23
ASR
24
ωr* GENERATOR
1
2F
FUNCTION GENERATOR
21
θdc
8
1/s
ω1
P/2
7
ωr
Fs
Fc
COMPUTING UNIT
18D
Ia
Ir
ar
dq
22
Idc
Iqc
29
29
AXIS ERROR ESTIMATOR
25
Δθc
PI
26
ωr
IO
IOs
9
S/H
9
S/H
S/H
9
PHASE CURRENT REPRODUCER
27
Iu
Iv
Iw
3Φ
dq
28

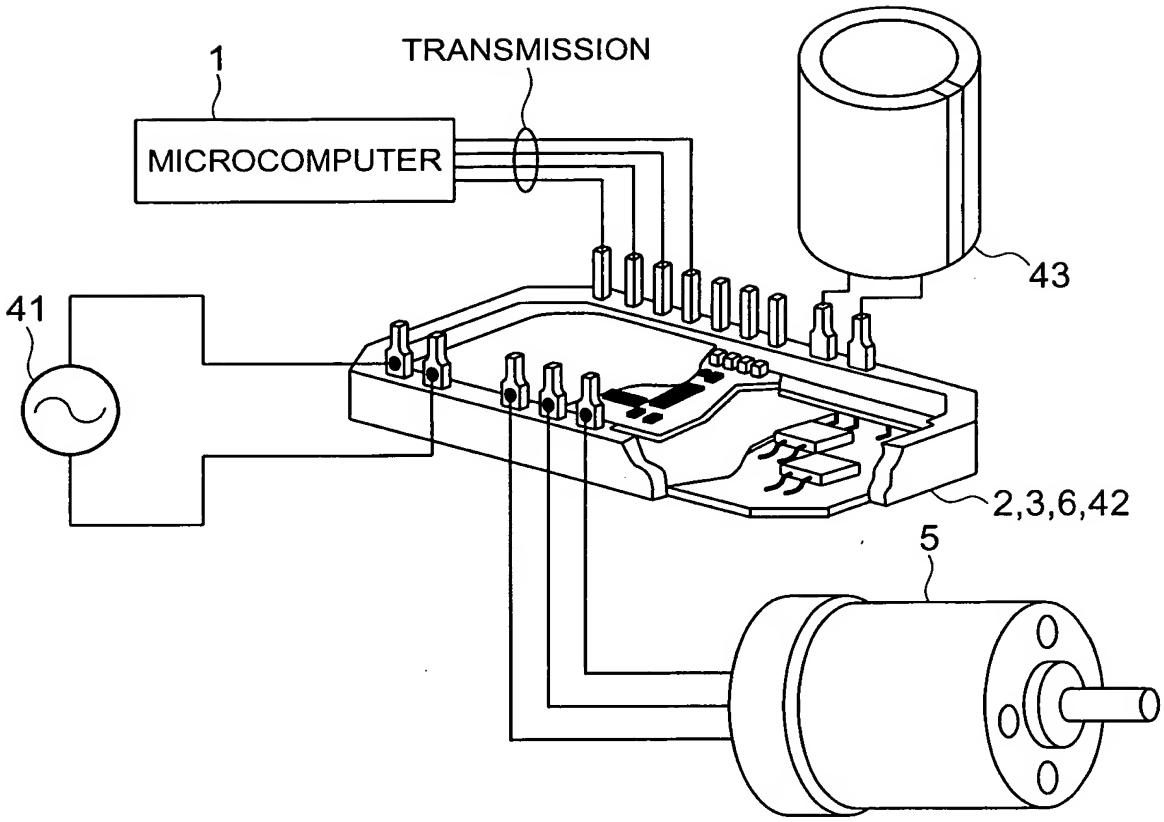



FIG. 17